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EXAMINER

LEE, EUGENE

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Please find below and/or attached an Office communication concerning this application or proceeding.

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/478,812
Filing Date: January 07, 2000
Appellant(s): SUGANO ET AL.

Ronald P. Kananen
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 1/25/08 appealing from the Office action mailed 8/28/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,529,951	NOGUCHI	6-1996
5,798,744	TANAKA	8-1998
6,037,197	YAMAZAKI	3-2000

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 11, 27, 39, 53, 63, and 73 are rejected under 35 U.S.C. 102(b) as being rejected by Noguchi et al. 5,529,951. Noguchi discloses (see, for example, FIG. 23A-23E) a MOS

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transistor (thin film semiconductor device) 260 comprising a polycrystalline silicon thin film (semiconductor thin film) 241a, gate insulating film 243, and gate electrode 246. In column 22, lines 46-47, Noguchi discloses the silicon thin film having a thickness of 40 nm (30-80 nm). In column 22, lines 48-54, Noguchi discloses the excimer laser light being irradiated on the amorphous silicon layer which recrystallizes the layer to a polycrystalline thin film. This excimer laser light is a single shot radiation that avoids the poor uniformity that is found in the polycrystalline films that have irradiation in several pulses (see, for example, column 2, lines 51-64 of Noguchi). In FIG. 21, Noguchi discloses an excimer laser light (single shot irradiation) 215 that forms a borderless (uniform) silicon thin film.

The limitation “wherein said semiconductor thin film is accumulated without exposing said substrate to the air” is a product-by-process limitation of producing a thin film with greater thickness.

Regarding claims 39, the limitation “irradiated with pulse laser light having an emission time width from upstand to downfall of at least 50 ns” is a product-by-process limitation of converting the semiconductor thin film into polycrystalline silicon.

Regarding claim 73, the limitation “substrate is cooled to a temperature lower than room temperature” is a product-by-process limitation of converting the semiconductor thin film into polycrystalline silicon.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 12, 28, 40, 54, 65, and 74 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. '951 as applied to claims 11, 27, 39, 53, 63, and 73 above, and further in view of Tanaka et al. 5,798,744. Noguchi does not disclose a display device comprising a pair of substrates adhered to each other with a prescribed gap, and an electrooptical substance maintained in said gap, one of said substrate comprises a counter electrode, the other substrate comprises a pixel electrode and a thin film transistor driving said pixel electrode. However, Tanaka discloses (see, for example, FIG. 3) a liquid crystal display apparatus comprising pair of substrates 12/10, liquid crystal (electrooptical substance) 200, counter electrodes 170r, and pixel electrode 150. These components are used to form liquid pixels in a LCD display apparatus. Therefore, it would have been obvious to one of ordinary skill in the art at time of invention to have a display device comprising a pair of substrates adhered to each other with a prescribed gap, and an electrooptical substance maintained in said gap, one of said substrate comprises a counter electrode, the other substrate comprises a pixel electrode and a thin film transistor driving said pixel electrode in order to form the thin film semiconductor device in a LCD display apparatus.

Regarding claim 28, the limitation "said semiconductor thin film is accumulated by alternately repeating said film forming step, where each additional formed film is about 1 nm" produces a semiconductor thin film of greater thickness. Increasing the thickness of a thin film increases its current carrying capacity. Therefore, it would have been obvious to one having

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ordinary skill in the art at the time of the invention was made to form a layer of about 30 to 80 nm and accumulate the semiconductor thin films in order to produce a thin film with greater current carrying capacity.

5. Claim 17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. 5,529,951 in view of Yamazaki et al. 6,037,197. Noguchi discloses (see, for example, FIG. 23A-23E) a MOS transistor (thin film semiconductor device) 260 comprising a polycrystalline silicon thin film (semiconductor thin film) 241a, gate insulating film 243, and gate electrode 246. In column 22, lines 46-47, Noguchi discloses the silicon thin film 241 having a thickness of 40 nm (30-80 nm). In column 22, lines 48-54, Noguchi discloses the excimer laser light being irradiated on the amorphous silicon layer which recrystallizes the layer to a polycrystalline thin film. This excimer laser light is a single shot radiation that avoids the poor uniformity that is found in the polycrystalline films that have irradiation in several pulses (see, for example, column 2, lines 51-64 of Noguchi). In FIG. 21, Noguchi discloses an excimer laser light (single shot irradiation) 215 that forms a borderless (uniform) silicon thin film. Noguchi does not disclose said at least one unit. However, Yamazaki discloses (see, for example, FIG. 1C) a pixel matrix circuit comprising three TFTs (said units). In column 5, lines 43-45, Yamazaki discloses that pixel matrix circuits have more than one million TFTs. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have said at least one unit in order to form the thin film semiconductor device in a pixel matrix circuit of an LCD device.

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6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. '951 in view of Tanaka et al. '744 as applied to claims 12, 28, 40, 54, 65, and 74 above, and further in view of Yamazaki et al. 6,037,197. Noguchi in view of Tanaka does not disclose said at least one unit. However, Yamazaki discloses (see, for example, FIG. 1C) a pixel matrix circuit comprising three TFTs (said units). In column 5, lines 43-45, Yamazaki discloses that pixel matrix circuits have more than one million TFTs. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have at least one unit in order to form the thin film semiconductor device in a pixel matrix circuit of an LCD device.

Product-by-Process Limitations

While not objectionable, the Office reminds Applicant that “product by process” limitations in claims drawn to structure are directed to the product, per se, no matter how actually made. *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also, *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wethheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al.*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a “product by process” claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in “product by process” claims or *otherwise*. Note that applicant has the burden of proof in such cases, as the above case law makes clear. Determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production.

The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979) (holding “interbonded by interfusion” to limit structure of the claimed composite and noting that terms such as “welded,” “intermixed,” “ground in place,” “press fitted,” and “etched” are capable of construction as structural limitations.)

In this case, the limitation “wherein said semiconductor thin film is accumulated without exposing said substrate to air to accumulate said semiconductor thin film” is a product-by-process limitation of making a structure of a thin film of greater thickness. Therefore, since the claims are directed towards product, and the product (i.e. a thin film including polycrystalline silicon) formed by the product-by-process claim is the same as or obvious from a product of the cited prior art (see, for example, column 22, lines 48-54 of Noguchi '951), Noguchi still reads on the limitation.

(10) Response to Argument

The Appellant's arguments against the anticipatory rejection is based on process steps that allegedly distinguish the semiconductors from those of the prior art. However, the claimed process steps are not germane to the claims being examined in the instant application. This is because the invention, as set forth in the claims, is clearly directed to a product. Therefore, the

process steps for making the invention fails to structurally distinguish the claimed invention (i.e. a thin film including polycrystalline silicon) from the disclosure of Noguchi 5,529,951.

Regarding the appellant's argument in the Introduction on the bottom of page 8 of the appeal brief filed 1/25/08 that the Examiner ignored features of the claims as product by process limitations and that the process steps in the present claims do in fact ascribe a structural feature to the semiconductor made thereby, which distinguish the semiconductors from those of the prior art, the Examiner respectfully disagrees because the structural features (i.e. a thin film including polycrystalline silicon) ascribed by the process is still disclosed in the cited Prior Art (Noguchi 5,529,951). The Examiner in no way ignores features of the claim, and fully considers the implied structural features of the process steps.

Regarding the appellant's argument on page 9 that "B. All Pending Claims Are Prima Facie Patentable Over the Applied Art When The Limitation "Accumulation Without Exposing the Film to Air" is Considered", this argument is not persuasive. The limitation "Accumulation Without Exposing the Film to Air" is clearly a product-by-process limitation of forming a thicker singular semiconductor thin film (as formed by the appellant), and does not add any structural feature beyond a thin film including polycrystalline silicon. Further reading the appellant's disclosure (see, for example, page 17 of the specification), the appellant details the process as "alternately repeating the film forming step and the laser annealing step to accumulate the semiconductor thin films" and then states the resultant final structure as "**a semiconductor thin film having an extremely good crystallinity can be finally obtained.**" That is the final structural feature ascribed to the process as detailed by the appellant's specification. The

Examiner does not ignore this structural feature and shows in Noguchi the same structural feature, and therefore, the cited prior art still reads on the appellant's claims.

The appellant's argument on the bottom of page 9 that the process "By employing such a repeating process in vacuum (or inert gas) a step of removing contamination substances and dusts from the air can be eliminated and thus improvement in throughput is considerable. Crystals of high quality can be formed", this argument is not persuasive. The process recited above does not disclose anything structurally distinct except a single thin film including polycrystalline silicon. In column 22, lines 48-54, Noguchi discloses the excimer laser light being irradiated on the amorphous silicon layer which recrystallizes the layer to a polycrystalline thin film. Such a resultant polycrystalline thin film in Noguchi would have the same structure that is recited in the applicant's claims. The appellant has not provided reasons why the process of "accumulating" thin films would structurally distinguish a structure of a thin film including polycrystalline silicon as disclosed by Noguchi. The appellant states "removing contamination substances and dusts from the air"; however, such a benefit would be found in Noguchi since the thin film including polycrystalline silicon is also not exposed to contamination substances and dusts from the air since the process of forming such a film does not include "accumulating thin films" but only needs laying down one single film. Also, proclaiming such benefits is purely speculative in nature and does not concretely ascertain any structural features to the final structural product. Further, since the thin film including polycrystalline silicon is purely a polycrystalline silicon film it would be understood that the polycrystalline silicon thin film in Noguchi is also the same structure as a semiconductor thin film accumulated without exposing said substrate to air to accumulate said semiconductor thin film in appellant's claim by virtue of

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the fact that Noguchi is a polycrystalline silicon film and not a polycrystalline silicon film containing a silicon oxide film since exposing a polycrystalline thin film to air would produce a oxidized polycrystalline thin film with SiO₂. So even if the process of "semiconductor thin film is accumulated without exposing said substrate to air to accumulate said semiconductor thin film" had patentable weight, the polycrystalline thin film in Noguchi would also be understood to have undergone this same process based on the fact that the polycrystalline thin film is a polycrystalline thin film and not an oxidized polycrystalline thin with SiO₂ regions.

Regarding the appellant's argument on page 11 that "C. Failure to Consider the "Irradiated with Pulse Light" Limitation is Error", this argument is not persuasive. This limitation is a product-by-process limitation. The appellant states numerous instances in the specification wherein this process results in structural changes. However, while looking through these instances (see, for example, page 65, line 9, and page 92, line 22 of the specification) and reading the rest of the appellant's disclosure, the only definitive resulting structural change is a thin film including polycrystalline silicon, which, as stated above, Noguchi clearly discloses.

Regarding the appellant's argument on page 11 that "D. The Failure to Consider the "Cooling" Limitation in Claim 73 is Error", this argument is not persuasive. Like the preceding paragraph, this is a product-by-process limitation of forming a thin film including polycrystalline silicon. On page 95, the appellant states that resultant structure, from the process of cooling, is a polycrystalline material, which Noguchi clearly discloses. The feature of the increasing the probability of generation of crystal nuclei is a feature of the polycrystalline material that, as stated before, is clearly disclosed by Noguchi.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Eugene Lee/

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